RUSS, AUGUST & KABAT
Marc A. Fenster, State Bar No. 181067
mfenster@raklaw.com
Benjamin T. Wang, State Bar No. 228712
bwang@raklaw.com
Neil A. Rubin, State Bar No. 250761
nrubin@raklaw.com
Bahrad A. Sokhansanj, State Bar No. 285185
bsokhansanj@raklaw.com
James S. Tsuei, State Bar No. 285530
jtsuei@raklaw.com
12424 Wilshire Boulevard, 12th Floor
Los Angeles, California 90025
Telephone: (310) 826-7474
Facsimile: (310) 826-6991

Attorneys for Plaintiff
COREPHOTONICS, LTD.

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN JOSE DIVISION

COREPHOTONICS, LTD.

Plaintiff,

vs.

APPLE INC.

Defendant.

Case No. 5:17-cv-06457-LHK (lead case)
Case No. 5:18-cv-02555-LHK

[Assigned to The Honorable Lucy H. Koh, Courtroom 8 - 4th Floor]

PLAINTIFF COREPHOTONICS LTD.'S OPENING CLAIM CONSTRUCTION BRIEF

Hearing
Date: January 17, 2019
Time: 1:30 p.m.
Place: Courtroom 8, 4th Floor
Judge: Hon. Lucy H. Koh

Original Complaint Filed:
November 6, 2017

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I. INTRODUCTION

The parties dispute five terms across the five patents-in-suit. For each of these five terms the patentee clearly acted as its own lexicographer and defined the terms in the patent specifications. Corephotonics' proposed constructions correctly track the actual language defining the terms in the specification, and they are faithful to the patentee's description of the invention. By contrast, Apple's proposed constructions diverge from the actual language in the specification and modify it, by either importing limitations from merely exemplary embodiments or selectively ignoring the patents' disclosure. As shown below, Apple's proposed deviations from the patentee's lexicography are not supported by intrinsic evidence and do not fit within the context of the claimed invention. Accordingly, Corephotonics' proposed constructions should be adopted.

II. BACKGROUND OF THE ASSERTED PATENTS

A. Technology Overview

The Asserted Patents[1] all relate to Corephotonics' innovative miniature *zoom* camera technology for mobile devices, such as smartphones. By way of background, a camera lens has an associated focal length, which corresponds to the power of the lens to resolve objects at a distance from the camera. A camera lens with a larger focal length resolves images at a greater distance with a narrower field of view, the angular width of what can be seen through the camera. In the prior art, zoom was performed optically, by physically moving lens elements in a camera relative to each other to increase or decrease the focal length. Optically "zooming in" to resolve images at closer distances to the camera entails increasing the focal length of the camera lens, and "zooming out" requires decreasing the focal length. While a mechanical zoom solution worked for portable digital cameras, it requires a camera assembly that is too large, as well as more expensive and less reliable than the fixed focal lengths that are generally used in mobile phones. *See* '291 pat. 1:39-42; '152 pat., 1:35-43. Alternatively, digital zoom solutions process the image to crop and scale it to create the appearance of zoom. However, digital zoom reduces resolution and deteriorates the

[1] The patents-in-suit in the consolidated action are U.S. Patent Nos. 9,185,291 (the "'291 patent"), 9,402,032 (the "'032 patent"), 9,538,152 (the "'152 patent"), 9,568,712 (the "'712 patent"), and 9,857,568 (the "'568 patent") (collectively, the "Asserted Patents").

image quality, unless the camera also includes thick optics or large, expensive sensors. '291 pat., 1:43-48; '152 pat., 1:46-51.

Corephotonics developed an innovative dual-aperture fixed-focal length lens camera technology for optical zoom that can fit in a mobile device and provide superior performance to the prior art. Corephotonics' dual-camera technology combines the wide-angle camera that smartphones typically use, along with a second miniature *telephoto* lens. The telephoto lens offers a larger focal length that provides higher resolution in a narrower field of view. The dual-camera system thereby enables optical zoom. At the heart of Corephotonics' innovation and the Asserted Patents are solutions to the practical obstacles to making the zoom dual camera approach work. Corephotonics developed innovative fixed-focal length telephoto lens assembly technology with a small thickness and good quality imaging characteristics. *See* '032 pat., 1:27-38; '291 pat., 12:14-20. Corephotonics also developed innovative image processing technologies for implementing digital zoom with the dual wide-angle / telephoto camera system. The subject matter of the Asserted Patent claims is further described below.

B. The '032, '712, and '568 Patents ("Lens Patents")

The Lens Patents all stem from a common application. They are directed to providing a miniature telephoto lens assembly usable in mobile devices, such as smartphones. *See, e.g.*, '712 pat., 1:18-22. In particular, the Lens Patents are directed to providing a compact lens assembly with a small total track length (TTL) and small ratio of TTL to the effective focal length (EFL) of the lens assembly. *Id.*, 1:25-41, 1:62-2:2. The total track length (TTL) determines the physical length of the camera, so a small TTL results in a smaller, more compact camera. The effective focal length (EFL) determines how well the camera performs at capturing images of small or distant objects. A lens with a greater EFL is able to capture images of such objects with greater detail. All claims of the Asserted Patents require that the TTL be smaller than the EFL, *i.e.*, that the TTL to EFL ratio be smaller than 1.0. This provides a telephoto lens assembly that can be utilized in a thin dual camera optical zoom system suitable for smartphones. The asserted Lens Patent claims relate to different lens parameters that yield a system with a TTL smaller than the

EFL, along with other optical properties. An example is Claim 15 of the '712 patent, highlighting the claim term in dispute:

> 15. A lens assembly, comprising: a plurality of refractive lens elements arranged along an optical axis, wherein the lens assembly has an effective focal length (EFL) and **a total track length (TTL)** smaller than the effective focal length (EFL), the plurality of refractive lens elements comprising, in order from an object plane to an image plane along the optical axis, a first lens element having positive optical power, a pair of second and third lens elements having together a negative optical power, and a combination of fourth and fifth lens elements, the fourth lens element separated from the third lens element by an air gap greater than **TTL**/5.

The following drawing is an exemplary embodiment, which shows exemplary shapes of lenses and gap distances. '712 pat., Fig. 1A.

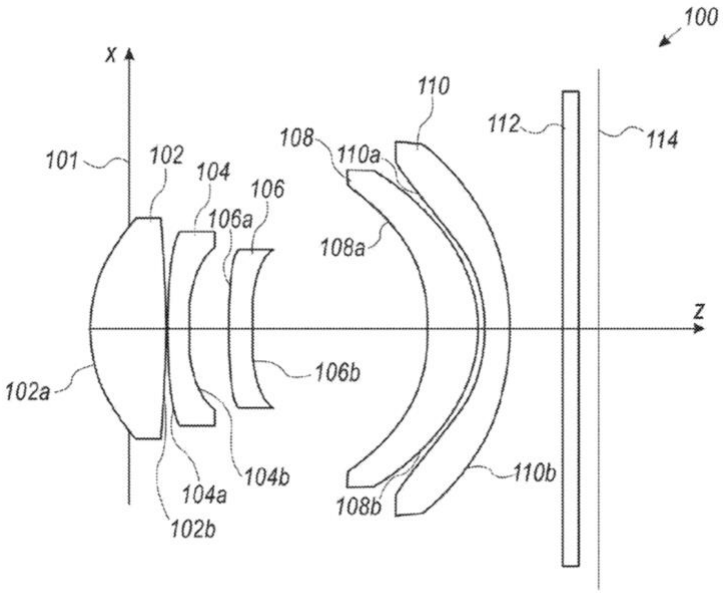

FIG. 1A

C. The '152 Patent

The '152 patent describes innovative technology for combining images from multiple cameras in an integrated multiple camera system to improve zoom, image and color resolution, and image quality to account for the trade-off of limiting camera size. *See, e.g.,* '152 pat., 1:60-2:3. The '152 patent's claims are directed to a multi-aperture imaging system with a wide-angle and telephoto camera enabling optical zoom along with digital zoom. As discussed above, a wide-

angle camera provides a lower level of optical zoom. The telephoto camera, with a narrower angle field of view, provides a higher level of optical zoom. Fig. 1B of the '152 patent illustrates the different levels of optical zoom of the wide-angle (Wide) and telephoto (Tele) cameras. As Fig.

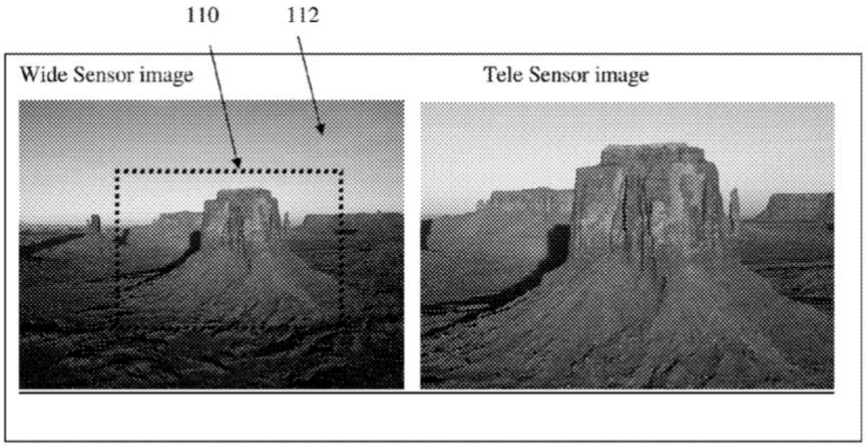

FIG. 1B

1B shows, when the dual-camera system is pointed at a scene, the Tele camera image will represent a subset of the Wide camera image. This will result in an overlap between the image from the Tele camera and the image from the Wide camera. The '152 patent also teaches that the Wide and Tele images will have distinct points of view, as they are obtained from two distinct cameras. *See* '152 pat., 9:13-30. In particular, the '152 patent teaches that the point of view of the output image is determined by the primary image, which is the Wide or Tele image showing what is seen from the angle of the Wide or Tele camera. *See* '152 pat., 9:26-28 ("The output image point of view is determined according to the primary image point of view (camera angle)."). The '152 patent teaches that the primary image can be the Wide or Tele image, such that the output image is from the point of view of the Wide or Tele camera, depending on the zoom factor.

> If the chosen ZF is larger than the ratio between the focal-lengths of the Tele and Wide cameras, the Tele image is set to be the primary image and the Wide image is set to be the auxiliary image. If the chosen ZF is smaller than or equal to the ratio between the focal-lengths of the Tele and Wide cameras, the Wide image is set to be the primary image and the Tele image is set to be the auxiliary image.
>
> '152 pat., 9:31-40.

Exemplary claim 1 of the '152 patent provides as follows (emphasis added to highlight the disputed claim terms):

> 1. A multi-aperture imaging system comprising:
>
> a) a first camera that provides a first image, the first camera having a first field of view (FOV_1) and a first sensor with a first plurality of sensor pixels covered at least in part with a **standard color filter array (CFA)**;
>
> b) a second camera that provides a second image, the second camera having a second field of view (FOV_2) such that $FOV_2<FOV_1$ and a second sensor with a second plurality of sensor pixels, the second plurality of sensor pixels being either Clear or covered with a standard CFA, the second image having an overlap area with the first image; and
>
> c) a processor configured to provide an output image from a point of view of the first camera based on a zoom factor (ZF) input that defines a respective field of view (FOV_{ZF}), the first image being a primary image and the second image being a non-primary image, wherein if $FOV_2<FOV_{ZF}<FOV_1$ then the point of view of the output image is that of the first camera, the processor further configured **to register the overlap area of the second image as non-primary image to the first image as primary image to obtain the output image**.

Claim 1 thereby provides that when the camera is set at an intermediate level of zoom between the Wide and Tele cameras, the system will produce an output image at that zoom factor by registering the overlap area of the Tele camera image (as the image with the smaller field of

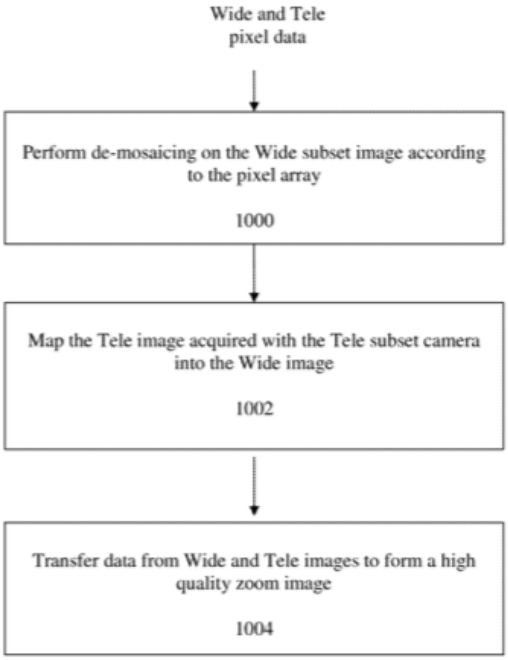

FIG. 10

view, and thus the non-primary image) to the Wide camera image (as the image with the larger field of view, and thus the primary image). The point of the view of the Wide camera will determine the point of view of the image output by the camera system. Fig. 10 of the '152 patent shows a flowchart that describes the "Processing Flow," which describes acquiring images from the Wide and Tele cameras and processing them by mapping the Tele image to the Wide image and transferring data from the images to form output zoom image. *Id.*, 7:49-51.

Another claim term at issue is "standard color filter array (CFA)." By way of background, an image sensor pixel generally produces an electrical signal that corresponds to the intensity of light illuminating that area of the image sensor. Placing a color filter over a particular sensor pixel then allows that pixel to be selectively activated by a particular color of light, which allows the sensor to detect both color and spatial information from the optical image. The '152 patent teaches that the camera system also may include various kinds of color filter array placed over the Wide or Tele image sensor. *See id.*, 5:40-59, 6:27-7:47; Figs. 2-9 (showing diagrams of exemplary color filter arrays). Certain embodiments of the '152 patent inventions may remove image artifacts caused by images in a multi-camera system being captured by different sensors with different color filter arrays. *See id.*, 2:4-15.

D. The '291 Patent

The '291 patent is directed to thin dual-lens digital cameras with optical zoom, which operate in both video and still mode. '291 pat., 3:14-24. The '291 patent generally describes technology that uses image fusion to combine the images from the wide-angle ("Wide") and telephoto ("Tele") cameras for still pictures, but does not use image fusion for video. In particular, the '291 patent discloses processing for the "still camera mode," which includes capturing synchronous images from both the Wide and Tele cameras, and fusing the Wide and Tele images "to achieve optical zoom." *Id.* at 7:25-39. In continuous video mode, the '291 patent discloses digitally zooming either the Wide camera image or Tele camera image, depending on the level of zoom. For example, when zooming in, the video output will be from the Wide camera, up to a point at which the output will switch to being from the Tele camera. *Id.*, 10:30-34. Exemplary

claim 1 of the '291 patent provides as follows (highlighting the claim terms proposed for construction):

> **1.** A zoom digital camera comprising:
>
> **a)** a Wide imaging section that includes a fixed focal length Wide lens with a Wide field of view (FOV), a Wide sensor and a Wide image signal processor (ISP), the Wide imaging section operative to provide Wide image data of an object or scene;
>
> **b)** a Tele imaging section that includes a fixed focal length Tele lens with a Tele FOV that is narrower than the Wide FOV, a Tele sensor and a Tele ISP, the Tele imaging section operative to provide Tele image data of the object or scene; and
>
> **c)** a camera controller operatively coupled to the Wide and Tele imaging sections, the camera controller configured to combine in still mode at least some of the Wide and Tele image data to provide a **fused output image of the object or scene from a particular point of view** and to provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution;
>
> wherein the video output images are provided with a **smooth transition** when switching between a lower zoom factor (ZF) value and a higher ZF value or vice versa, wherein at the lower ZF value the output resolution is determined by the Wide sensor, and wherein at the higher ZF value the output resolution is determined by the Tele sensor.

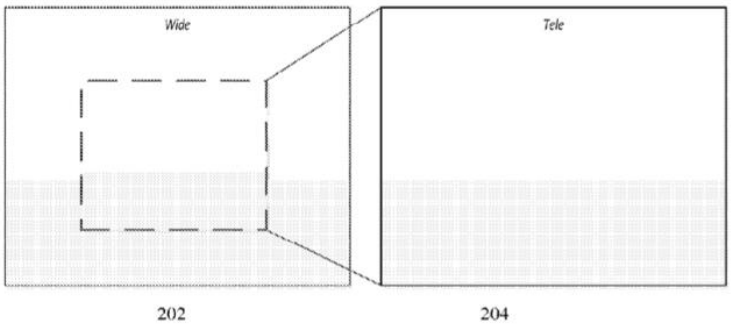

FIG. 2

Fig. 2 of the '291 patent illustrates the issues that arise due to the different fields of view of the Wide camera and the Tele camera, similar to the issues discussed above for the '152 patent. As Fig. 2 shows, because the Tele camera has a narrower field of view than the Wide camera, the Tele camera generates images that overlap within a subset portion of the wider field of view of the image generated by the Wide camera.

The '291 patent discloses the acquisition of single zoom images that combine image data from the Tele and Wide cameras in the still camera mode. *Id.*, 9:15-43. The Wide and Tele cameras will be at separate positions on a device, as shown in Fig. 1B of the '291 patent. Because the cameras are at different spatial positions, the Wide and Tele cameras take images seen from different points of view (POV). *Id.*, 4:60-5:2. The patent further discloses how the camera controller can be configured in still mode to provide a fused output image from the point of view of the Tele camera at higher levels of zoom, a fused output image from the point of view of the Wide camera at lower levels of zoom, and transition between those while zooming in and out. *Id.*, 9:52-10:10.

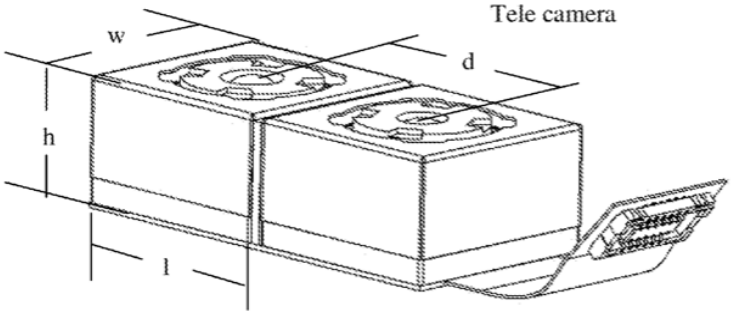

FIG. 1B

During video zoom, *i.e.*, when the camera is being zoomed in and out while a video is being displayed, the zoom operation switches between Wide and Tele cameras. *Id.*, 10:56-11:5. The '291 patent teaches that while displaying video, if the zoom operation switches "between sub-cameras or points of view, a user will normally see a 'jump' (discontinuous change)." *Id.*, 10:13-17. The '291 patent addresses this problem by providing a video zoom with a "smooth transition" during this switchover, which the '291 patent defines "a transition between cameras or POVs that minimizes the jump effect." *Id.*, 10:17-19. The parties have agreed that "smooth transition" should be construed according to this definition. The '291 patent goes on to teach methods for achieving a smooth transition in video zoom mode, including position matching, to address the different spatial perspectives and viewing angles of each camera, as well as matching scale, brightness, and color. *Id.*, 10:19-27 *et seq.*

The '291 patent further describes a continuous zoom system design to "reach high quality continuous and smooth optical zooming in video camera mode while reaching real optical zoom using fixed focal length sub-cameras." *Id.*, 6:47-51. The '291 patent teaches that the continuous zoom system design can be configured based on the relationship between the Wide and Tele camera fields of view, and the ratio between the number of pixels detected by a sensor and the number of pixels displayed by the output video. *See id.*, 6:50-7:22. In general, a sensor detects more pixels than are displayed in video, and the patent calls this an "oversampling ratio." *Id.*, 6:60-65. As the '291 patent describes, this oversampling ratio is relevant to identifying the switchover point between the Wide and Tele cameras, and the maximum optical zoom. *Id.*, 6:67-7:11.

The '291 patent further discloses compact lenses that achieve optical zoom with a small total track length (TTL) with a small "thickness/focal length" ratio. The embodiments disclosed in the '291 patent provide a TTL less than EFL, like those disclosed in the Lens Patents. *See* '291 pat., 12:13-20 *et seq.*, Figs. 8, 9.

III. TERMS WITH AGREED UPON CONSTRUCTIONS

Asserted Claims	Term or Phrase	Agreed Construction
'291 patent, claims 1, 12	"smooth transition"	a transition between cameras or points of view that minimizes the jump effect

IV. DISPUTED CLAIM TERMS

A. "total track length (TTL)" / "total length (TTL)" (*'032 patent, claim 1; '712 patent, claim 1, 15, 19; '568 patent, claim 1; '291 patent, claim 6*)

Corephotonics' Proposed Construction	Apple's Proposed Construction
length on an optical axis between the object-side surface of the first lens element and the electronic sensor	length on an optical axis between the object-side surface of the first lens element and the image plane

The Lens Patents identically define the TTL in the following statement in the specification: "The effective focal length of the lens assembly is marked 'EFL' and the **total track length** on an optical axis between the object-side surface of the first lens element and the **electronic sensor** is marked 'TTL'." '032 pat., 1:60-63; '712 pat., 1:62-65; '568 pat., 2:1-4 (emphasis added). This is

a case, therefore, in which the specification "acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1321 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *see also Martek Biosciences Corp. v. Nutrinova, Inc.*, 579 F.3d 1363, 1380 (Fed. Cir. 2009) ("When a patentee explicitly defines a claim term in the patent specification, the patentee's definition controls.").

Apple's construction, however, deviates from the plain text in the specification, substituting the words "image plane" for "electronic sensor." The image plane and the electronic sensor are different things, which may or may not coincide. In other words, the electronic sensor may be at the image plane, but it is not necessarily so. The specification differentiates between the words "image plane" and "image sensor" when describing an embodiment in which they would be at the same location. "Moreover, an image sensor (not shown) is disposed at image plane **114** for the image formation." '032 pat., 3:14-16; '712 pat., 3:14-16; '568 pat., 3:40-42. *See also, e.g.*, '712 pat., 1: 58-62 ("An optical lens system incorporating the lens assembly may further include . . . an image sensor with an image plane on which an image of the object is formed.").

Apple has also cited numerous pieces of extrinsic evidence in support of its position in the Joint Claim Construction Statement. As an initial matter, this extrinsic evidence is "less significant" than the intrinsic record. *Phillips*, 415 F.3d at 1317; *see also Honeywell Int'l, Inc. v. Universal Avionics Sys. Corp.*, 493 F.3d 1358, 1361 (Fed. Cir. 2007) ("When a patentee defines a claim term, the patentee's definition governs, even if it is contrary to the conventional meaning of the term."). And, at most, the extrinsic evidence presents a contradictory record. Notably, patent references cited by the Lens Patents provide definitions for TTL consistent with the disclosure in the Lens Patents and Corephotonics' proposed construction. These cited references constitute intrinsic evidence and are thus afforded greater weight than other extrinsic evidence which Apple may cite. *V-Formation, Inc. v. Benetton Grp. SpA*, 401 F.3d 1307, 1311 (Fed. Cir. 2005) (holding that "prior art cited in a patent or cited in the prosecution history of the patent constitutes intrinsic evidence"). In particular, these cited references expressly state that "a distance on the optical axis

between the object-side surface of the first lens element and the **electronic sensor** is TTL." *See, e.g.*, U.S. 8,310,768 at 2:8-10, 3:48-51; U.S. 8,395,851 at 1:66-2:1, 2:20-23 (emphasis added).

In the Joint Claim Construction Statement, Apple also cites a Corephotonics patent application included in the '291 patent file history as supporting its position, which has been excerpted and attached hereto as Exhibit 1. That reference, however, defines TTL in a manner consistent with the definition set forth in the Lens Patents' specification. In that application, while the drawing cited by Apple labels the surface as the "image plane," the accompanying definition clarifies that TTL is to be measured to the surface of the electronic (image) *sensor*. Ex. 1 at COREPH000961 ("The TTL, see FIG. 1, is defined as the maximal distance between the object-side surface of a first lens element and a camera image ***sensor*** plane.") (emphasis added).

In sum, Apple's deviation from the clear lexicography for "total track length" lacks sufficient support, and it is inconsistent with the focus of the inventions on the actual length of the camera module, from the lens to the sensor. Importantly, Apple's proposed substitution of the term "image plane" is also unnecessary and unhelpful. From the jury and Court's perspective, the term "electronic sensor" is clearly defined and determined by the physical position of the sensor in the accused products. Accordingly, Corephotonics' proposed construction should be adopted.

B. "standard color filter array (CFA)" (*'152 patent, claims 1, 3*)

Corephotonics' Proposed Construction	Apple's Proposed Construction
a color filter array (CFA) that includes a RGB (Bayer) pattern or a non-Bayer pattern such as RGBE, CYYM, CYGM, RGBW#1, RGBW#2 or RGBW#3	a color filter array (CFA) including a RGB (Bayer) pattern, RGBE, CYYM, CYGM, RGBW#1, RGBW#2, or RGBW#3

Corephotonics proposes that "standard CFA" be construed precisely as the term is described in the '152 patent: "A 'standard CFA' may include a RGB (Bayer) pattern or a non-Bayer pattern such as RGBE, CYYM, CYGM, RGBW#1, RGBW#2 or RGBW#3." '152 pat., 2:43-49. As disclosed in the patent, the latter list of non-Bayer patterns are examples of non-Bayer patterns that a skilled artisan at the time of the invention would recognize as being "standard non-Bayer patterns." *Id.*, 2:46-47 ("Thus, reference may be made to "standard Bayer" or "standard non-

Bayer" patterns or filters."). The '152 patent then differentiates between what a skilled artisan would recognize as "standard non-Bayer" or "standard non-Bayer" filters from what the specification later discloses as exemplary non-standard Bayer filters. *See id.*, 2:38-63 ("As used herein, 'non-standard CFA' refers to a CFA that is different in its pattern that CFAs listed above as 'standard.' Exemplary non-standard CFA patterns may include . . . .").

Apple's proposal again deviates from the plain language in the specification by crossing out the phrase "such as" from the specification's definition. This runs afoul of the Federal Circuit's instruction that "[t]he standards for finding lexicography and disavowal are *exacting*." *GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) (emphasis added). For Apple's proposal to prevail, Apple would need to demonstrate that other parts of the specification include a "clear and explicit statement" by the patentee defining the claim term as it proposes. *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1367–68 (Fed. Cir. 2012). However, rather than providing exclusive lists of "standard" and "non-standard" CFA patterns, the only such "clear and explicit statement" in the specification is the aforementioned disclosure of an exemplary list prefaced by the word "such as." In the absence of an additional clear statement, the scope of the claim term should be the skilled artisan's ordinary and customary understanding of what the specification actually says, as in Corephotonics' proposal. *See Unwired Planet, LLC v. Apple Inc.*, 829 F.3d 1353, 1358 (Fed. Cir. 2016) ("Claim terms are generally given their ordinary and customary meaning as understood by a person of ordinary skill in the art when read in the context of the specification and prosecution history.").

C. "to register the overlap area of the second image as non-primary image to the first image as primary image to obtain the output image" (proposed by Corephotonics) / "register the overlap area of the second image as non-primary image to the first image as primary image" (proposed by Apple) (*'152 patent, claims 1, 3*)[2]

Corephotonics' Proposed Construction	Apple's Proposed Construction
to map the overlap area of the second image as the non-primary image to first image as the primary image, finding correspondences between the pixels in the two images for the overlap area, to form the output image using information from the non-primary and primary images together with the mapping information of the non-primary image to the primary image for the overlap area	map the overlap area of the second image as the non-primary image to the first image as the primary image, by finding correspondences between the pixels in the two images for the overlap area Apple proposes that the phrase requiring construction is provided in term 3 above, and "to obtain the output image" is an objective of the claimed registration and is not a limitation requiring construction

Apple's proposal fails to construe the claim term in its full context and thereby leaves out an important aspect of the claimed invention. Apple contends that "to obtain the output image" is what Apple calls an "objective" of the claim term, and thus does not require construction. Apple's position relies on two principle errors.

First, there is no basis to leave a portion of a claim term out of the construction based on it being an "objective" of the claimed limitation. Indeed, Apple's proposal to exclude this part of the claim term from construction altogether violates a bedrock principle of claim construction that a "claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so." *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005); *Pause Tech., LLC v. TiVo, Inc.*, 419 F.3d 1326, 1334 (Fed. Cir. 2005) ("In construing claims, however, we must give each claim term the respect that it is due.").

Second, Apple's assertion is also based on a flawed premise. In the context of the full claim limitation, *i.e.*, claim limitation 1.c) shown above, the output image that must be obtained is one "from a point of view of the first camera based on a zoom factor (ZF) input that defines a respective

[2] During the parties meet and confer process, Corephotonics encouraged Apple to propose a construction for the same term to streamline the Joint Claim Construction Statement for the Court. Apple declined to do so, rejecting Corephotonics' suggestion that it simply append "to obtain the output image" to the end of their proposed construction. However, as the issues are interrelated, Corephotonics briefs them together here.

field of view (FOV_{ZF}), the first image being a primary image and the second image being a non-primary image." '152 pat., cl. 1. The "to register . . . to obtain the output image" term cannot be interpreted in a way that is not consistent with the surrounding text of the claim limitation in which it occurs. *See Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1288 (Fed. Cir. 2017) (internal quotation omitted) ("[T]he context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of terms in a claim.").

When properly interpreted in the context of the claim as a whole, therefore, the objective of the disputed "to register . . . to obtain the output image" limitation is to obtain an output image that is "from a point of view of the first camera" as described in the rest of limitation 1.c). The "registration" of the disputed term must be registration that results in the "point of view of the output image" being "that of the first camera," as required by the rest of the claim; otherwise, adopting Apple's proposal would be contrary to Federal Circuit law and fail to give meaning to the claim in full.

Corephotonics' proposal, in contrast to Apple's, addresses the claim as a whole. As discussed above in § II.C, the point of view of the primary image is determined by what the primary camera sees. *See* '152 pat., 9:26-28 ("The output image point of view is determined according to the primary image point of view (camera angle)."). The "Processing Flow" section of the '152 patent, in turn, describes the claimed invention to thereby form an output image from the point of view of one of the two cameras, as illustrated in Fig. 10 (shown in § II.C). Corephotonics' proposed construction closely tracks the relevant language that the specification uses to describe the formation of the output image provided in the specification in the "Processing Flow" description. *See id.*, 8:2-4 ("In step **1002**, the Tele image is registered (mapped) into the Wide image. The mapping includes finding correspondences between pixels in the two images."), 8:27-29 ("In step **1004**, the data from the Wide and Tele images is processed together with the registration information from step **1002** to form a high quality output zoom image.") Corephotonics' proposal is also consistent with the described embodiments that relate to the '152 patent's claims. *See id.*, 4:36-45 ("the registration includes finding a corresponding pixel in the second Luma image for

each pixel in the first Luma image and the processing includes forming the output image by transferring information from the second image to the first image.") (emphasis added).

D. "fused output image of the object or scene from a particular point of view" (*'291 patent, claims 1, 12*)

Corephotonics' Proposed Construction	Apple's Proposed Construction
"output image of the object or scene from a particular point of view" means that "the object and scenes of the output image have the position and shape as would be seen from a defined point of view of one of the Wide or Tele lens" "a fused output image of an object or scene from a particular point of view" means "an output image that: if from the Wide point of view (POV), combines wide image data and that tele image data that corresponds to wide image data, such that the object or scenes of the output image have the position and shape as would be seen from the Wide lens, if from the Tele POV, combines tele image data and that wide image data that corresponds to tele image data, such that the object or scenes of the output image have the position and shape as would be seen from the Tele lens"	an output image of an object or scene, that, whether from the Wide or Tele point of view, includes both Wide and Tele image data

The central defect in Apple's proposed construction is that it fails to explain what is meant by a "output image of the object or scene from a *particular point of view*." In so doing, Apple fails to construe this claim term in the context of the claimed invention, as it must. Unlike Apple's, Corephotonics' proposed construction follows the '291 patent's definition point of view (POV). Following from the foregoing description of the '291 patent in § II.B, the relevant "point of view" of the camera is determined by position and shape of objects and scenes that the camera captures:

> In a dual-aperture camera image plane, as seen by each sub-camera (and respective image sensor), a given object will be shifted and have different perspective (shape). This is referred to as point-of-view (POV). **The system output image can have the shape and position of either sub-camera image or the shape or position of a combination thereof.** If the output image retains the Wide image shape then it has the Wide perspective POV. If it retains the Wide camera position then it has the Wide position POV. The same applies for Tele images position and perspective.

'291 pat., 4:60-5:2 (emphasis added). The specification of the '291 patent goes on to teach methods for generating fused output images with a (single) particular, consistent POV from the information in the Wide and Tele camera images. *See id.*, 5:5-10, 9:15-36, Fig. 5.

Corephotonics' proposed construction thereby addresses the meaning of "particular point of view," which Apple has failed to do. Unlike Apple's proposal, Corephotonics' also describes specifically what is meant by providing a fused output image from a particular point of view. Apple's proposal fails to address the potential dispute between the parties over the meaning of "particular point of view." *See O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1360 (Fed. Cir. 2008) (holding that when the parties raise an actual dispute regarding the proper scope of these claims, the court, not the jury, must resolve that dispute). Corephotonics' proposed construction for this term, therefore, should be adopted.

E. "sensor oversampling ratio" (*'291 patent, claims 4, 5, 13*)

Corephotonics' Proposed Construction	Apple's Proposed Construction
the ratio of the in-line (i.e. in a line) number of sensor pixels and in-line number of output video format pixels	no construction is necessary, but if the Court determines construction is required, Apple would propose: "the ratio of the in-line (i.e. in a line) number of sensor pixels in the Wide sensor to the in-line number of output video format pixels"

Corephotonics proposes a construction in order to inform and assist the jury, as it is a technical term. See, e.g., *GEODynamics, Inc. v. DynaEnergetics US, Inc.*, No. 2:17-CV-00371-RSP, 2018 WL 2123616, at *6 (E.D. Tex. May 8, 2018) (construing a technical term that "would be foreign to a jury" to "assist the jury to understand the claims). Apple remarkably holds the self-contradictory position that if the term were to be construed, it should then be able to import unwarranted limitations from disclosed embodiments. Apple concedes that a skilled artisan would look to the specification's description of an "oversampling ratio" to understand the claim term:

> In an embodiment, in order to reach high quality continuous and smooth optical zooming in video camera mode while reaching real optical zoom using fixed focal length sub-cameras, the system is designed according to the following rules (Equations 1-3):

> $\text{Tan}(FOV_{\text{Wide}})/\text{Tan}(FOV_{\text{Tele}})=PL_{\text{Wide}}/PL_{\text{video}}$ (1)
>
> where Tan refers to "tangent", while FOV_{Wide} and $F[OV]_{\text{Tele}}$ refer respectively to the Wide and Tele lens fields of view (in degrees). As used herein, the FOV is measured from the center axis to the corner of the sensor (i.e. half the angle of the normal definition). PL_{Wide} and PL_{video}, refer respectively to the "in-line" (i.e. in a line) number of Wide sensor pixels and in-line number of output video format pixels. The ratio $PL_{\text{Wide}}/PL_{\text{video}}$ is called ***an* "oversampling ratio"**.

'291 pat., 6:47-61 (emphasis added). This portion of the specification, however, does not support Apple's leap to the conclusion that *any* oversampling ratio must be with reference to the Wide sensor. The specification provides express caveats that this disclosure relates to "an" embodiment and the definition of "an" oversampling ratio. As such, the "sensor oversampling ratio" term in the claims need not always depend on the number of in-line pixels in the *Wide* sensor in particular. This is consistent with the term in the context of claims 4 and 13, which require "*a* sensor oversampling ratio."

Claim 5 further undercuts Apple's argument that any claim referring to "a sensor oversampling ratio" must necessarily be referring to the Wide sensor. Claim 5 refers to "the sensor oversampling ratio" in claim 4, and in turn requires that it be governed by an equation in which the ratio $PL_{\text{Wide}}/PL_{\text{video}}$ expressly appears and defines what that ratio means, in accord with the disclosed embodiment. Thus, if "sensor oversampling ratio" means the ratio $PL_{\text{Wide}}/PL_{\text{video}}$, that would make the definition of that ratio redundant in claim 5. *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1237 (Fed. Cir. 2016) ("Ideally, claim constructions give meaning to all of a claim's terms," and thus, "[c]onstruing a claim term to include features of that term already recited in the claims would make those expressly recited features redundant."). Accordingly, if this term is construed to assist the jury, it should be construed as Corephotonics proposes without improperly importing limitations from an exemplary embodiment.

V. CONCLUSION

For the foregoing reasons, Corephotonics respectfully requests that the Court adopt its proposed constructions of the disputed claim terms.

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Respectfully submitted,

RUSS, AUGUST & KABAT

By: */s/ Marc Fenster*

Marc A. Fenster (CA Bar No. 181067)
Benjamin T. Wang (CA Bar No. 228712)
Neil A. Rubin (CA Bar No. 250761)
Bahrad A. Sokhansanj (CA Bar No. 285185)
James S. Tsuei (CA Bar No. 285530)
RUSS AUGUST & KABAT
12424 Wilshire Boulevard, 12th Floor
Los Angeles, California 90025
Telephone: (310) 826-7474
Facsimile: (310) 826-6991
mfenster@raklaw.com
bwang@raklaw.com
nrubin@raklaw.com
bsokhansanj@raklaw.com
jtsuei@raklaw.com

Attorneys for Plaintiff
Corephotonics, Ltd.

CERTIFICATE OF SERVICE

I certify that counsel of record who are deemed to have consented to electronic service are being served on November 21, 2018, with a copy of this document via the Court's CM/ECF systems per Local Rule CV-5(a)(3). Any other counsel will be served by electronic mail, facsimile, overnight delivery and/or First Class Mail on this date.

/s/ *Marc A. Fenster*